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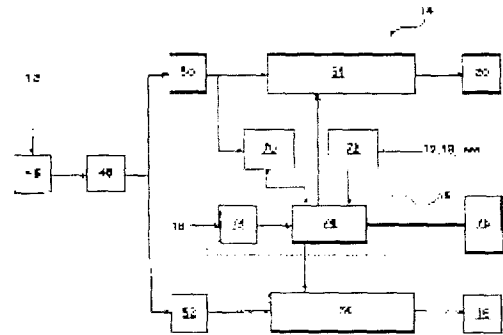
H04N 1/00

H04N 1/21

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SOLUTION: By frame ID information obtained by an ID information obtaining part 72 by prescanning, a parameter integration part 76 retrieves a storage means 78, reads the image processing information of a kind, an order and a processing condition, etc., in the simultaneous print of corresponding frames, supplies it to a setup part 70, sends the correction instruction information of an operator to a key correction part 74 and makes an adaptive correction amount be calculated. Based on the information, the setup part 70 sets the read condition of main scanning, sets the image processing condition so as to reproduce an image processing at the time of the simultaneous developing and printing from a calculated image feature amount or the like and the image processing information from the parameter integration part 76 and sends it to the parameter integration part 76. The integration part 76 corrects the image processing condition by the correction condition of density and gradation, etc.



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CLAIMS

[Claim(s)]

[Claim 1] A 1st setting means to be the image processing system which performs an image processing to the image data supplied from the image data source of supply, and to set up the 1st image-processing condition, An amendment directions means to perform image amendment directions, and said image amendment directions or a storage means to memorize the 1st image-processing condition further, A 2nd setting means to set up the 2nd image-processing condition according to said 1st image-processing condition and image amendment directions, According to said 2nd image-processing condition, it has an image-processing means to perform an image processing to the image data supplied from said image data source of supply. And said 2nd setting means The image processing system characterized by reproducing the 2nd image-processing condition set up previously using the corresponding 1st image-processing condition and image amendment directions in case image amendment directions or the image data the 1st image-processing condition is further remembered to be is processed for said storage means.

[Claim 2] It is the image processing system according to claim 1 with which said storage means memorizes both said image amendment directions and 1st image-processing condition when said 1st image-processing condition is setups to which fixed conditions or said 1st setting means analyzes and sets said image data and said 1st image-processing condition is setups.

[Claim 3] It is the image processing system according to claim 1 or 2 which has a display means to display the workmanship prediction image which processed image data according to said 2nd image-processing condition, and displays said workmanship prediction image in case this display means processes image amendment directions or the image data the 1st image-processing condition is further remembered to be for said storage means.

[Claim 4] The image processing system according to claim 1 to 3 which has a correction means to correct said image amendment directions in case image amendment directions or the image data the 1st image-processing condition is further remembered to be is processed for said storage means.

[Claim 5] The image processing system according to claim 1 to 4 which has the image amendment directions or a retrieval means to search the 1st image-processing condition further corresponding to the image data to process from said storage means.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention belongs to the technical field of the image processing used suitable for a digital photograph printer etc. which performs an image processing to the image data supplied from image data sources of supply, such as a film scanner.

[0002]

[Description of the Prior Art] The so-called direct exposure (analog exposure) of baking to the sensitive material (printing paper) of the image photoed by photographic films (it considers as a film hereafter), such as current, a negative film, and a reversal film, which projects the image of a film on sensitive material and exposes it is in use.

[0003] On the other hand, in recent years, the printing equipment using digital exposure, i.e., the image recorded on the film, was read in photoelectricity, and after making the read image into a digital signal, various image processings were performed and it considered as the image data for record, and scan exposure of the sensitive material was carried out by the record light modulated according to this image data, the image (latent image) was recorded, and the digital photograph printer considered as a print (workmanship) was put in practical use.

[0004] By the digital photograph printer, a jump of the image which originates an image in a backlight, speed light photography, etc. since image data processing can determine the exposure conditions at the time of printing as digital image data, amendment of TSUBURE, sharpness (sharp-izing) processing, etc. are performed suitably, and the high-definition print which was not obtained can be obtained in the conventional direct exposure. Moreover, an output is possible also for composition and image division of two or more images, and the print which could perform composition of an alphabetic character etc. by image data processing further, responded to the application, and was edited / processed freely. And according to the digital photograph printer, since it can supply image data to a computer etc. or it it not only outputs an image as a print (photograph), but can be saved at record media, such as a floppy disk, image data can be used for various applications other than a photograph.

[0005] Fundamentally such a digital photograph printer by carrying out incidence of the reading light to a film, and reading the projection light The scanner which reads in photoelectricity the image recorded on the film (image reader), The image processing system which performs a predetermined image processing to the image data supplied from the image data read with the scanner, a digital camera, etc., and is made into the image data, i.e., the exposure conditions, for image recording, The printer which carries out scan exposure of the sensitive material, and records a latent image by light beam scan, corresponding to the image data outputted from the image processing system (image recording equipment), A development is performed to the sensitive material exposed by the printer, and it has the processor (developer) considered as the print (workmanship) with which the image was reproduced, and is constituted.

[0006]

[Problem(s) to be Solved by the Invention] By the way, in the print creation which reproduces the image of a film, the so-called reprint which outputs again the image (coma) printed once as a print is performed according to a request of an extra copy etc. in many cases. In this case, it is

with the print (usually coincidence print) outputted previously and a reprint, and it is required that the color and concentration of the image reproduced by the print should be in agreement. However, also when a previous print and a reprint change in the color and concentration of an image with decision of an operator, differences in actuation, etc., it is plentifully, and there are also many complaints from a customer.

[0007] Furthermore, to be able to respond also to the so-called remake to which the image reproduced on a coincidence print is not pleasing, and a photograph printer creates again the print which added correction suitably is demanded.

[0008] If it is a photograph printer by the conventional direct exposure, a color and concentration adjustment of the print to create are performed by only the light exposure adjustment using a color filter, a diaphragm, etc. which are inserted into an exposure optical path, light exposure, i.e., exposure conditions, will add simply the automatic amendment by image analyses, such as LATD (large area transmission density), and the key amendment by the operator, and they will be determined. Therefore, if the amount of depth-of-shade adjustments for amendment is added to the exposure conditions in the case of a coincidence print in case the depth of shade is amended by remake, the image of the print obtained by remake can be predicted and can perform a monitor display etc. according to it. On the other hand, in a digital print system like the above-mentioned digital photograph printer, amendment is performed as mentioned above by the image (data) processing which used LUT (look-up table) etc. Here, in a digital image processing, generally, while assigning two or more functions to one LUT, the cascade (composition) of two or more LUTs is carried out. And the function of each LUT is accompanied not only by simple addition count but by nonlinear conversion. Therefore, even if it adds the correction by remake to the image-processing conditions in the case of the coincidence print by which the cascade was carried out simply, it is also difficult to make that prediction of the print obtained is impossible, and proper correction.

[0009] In the print system which outputs the print reproducing the image photoed with the image which the purpose of this invention has in solving the trouble of said conventional technique, and was photoed by the photographic film, the digital camera, etc. In the case of the reprint outputted according to a request of an extra copy etc., it is stabilized and the image of the last print and an image with same color and concentration can be reproduced. Moreover, it has the dissatisfaction in the last print and is in offering the image processing system which can create the print which corrected the image proper and suitably also on the occasion of the remake which corrected a color, concentration, etc., and which carries out print creation.

[0010]

[Means for Solving the Problem] A 1st setting means for this invention to be an image processing system which performs an image processing to the image data supplied from the image data source of supply, and to set up the 1st image-processing condition in order to attain said purpose. An amendment directions means to perform image amendment directions, and said image amendment directions or a storage means to memorize the 1st image-processing condition further. A 2nd setting means to set up the 2nd image-processing condition according to said 1st image-processing condition and image amendment directions. According to said 2nd image-processing condition, it has an image-processing means to perform an image processing to the image data supplied from said image data source of supply. And said 2nd setting means In case image amendment directions or the image data the 1st image-processing condition is further remembered to be is processed for said storage means, the image processing system characterized by reproducing the 2nd image-processing condition set up previously using the corresponding 1st image-processing condition and image amendment directions is offered.

[0011] moreover, when fixed conditions or said 1st setting means is the setups which analyze and set up said image data and said 1st image-processing condition is setups, said 1st image-processing condition As for said storage means, it is desirable to memorize both said image amendment directions and 1st image-processing condition. It has a display means to display the workmanship prediction image which processed image data according to said 2nd image-processing condition. This display means In case image amendment directions or the image data the 1st image-processing condition is further remembered to be is processed for said storage

means In case it is desirable to display said workmanship prediction image and it processes image amendment directions or the image data the 1st image-processing condition is further remembered to be for said storage means It is desirable to have a correction means to correct said image amendment directions, and it is desirable to have the image amendment directions or a retrieval means to search the 1st image-processing condition further corresponding to the image data to process from said storage means.

[0012]

[Embodiment of the Invention] Hereafter, the image processing system of this invention is explained to a detail based on the suitable example shown in an attached drawing.

[0013] The block diagram of an example of a digital photograph printer which uses the image processing system of this invention for drawing 1 is shown. The digital photograph printer (it considers as the photograph printer 10 hereafter) shown in drawing 1 The scanner 12 which reads fundamentally the image photoed by Film F in photoelectricity (image reader), The image processing system 14 which performs the image processing of image data (image information), actuation, control of the photograph printer 10 whole which were read, It has the printer 16 which carries out image exposure, carries out the development of the sensitive material (printing paper), and is outputted as a print (workmanship), and consists of light beams modulated according to the image data outputted from the image processing system 14. Moreover, the display 20 which displays the simulation image (workmanship prediction image) of the actuation system 18 which has keyboard 18a and mouse 18b for inputting directions of the input (setup) of various conditions, selection of processing, directions, a color / concentration amendment, etc., etc., and a coincidence print and the print outputted by reprint, various kinds of operator guidance, setup/registration screen of conditions, etc. is connected to an image processing system 14.

[0014] A scanner 12 is equipment which reads in photoelectricity the image photoed by Film F etc. The light source 22, a variable aperture 24, and the diffusion box 28 that makes homogeneity reading light which carries out incidence to Film F in the direction of a field of Film F, It has the image formation lens unit 32, the image sensors 34 which have the Rhine CCD sensor corresponding to each image reading of R (red), G (green), and B (blue), amplifier (amplifier) 36, and the A/D (analog to digital) converter 38, and is constituted.

[0015] Moreover, in the photograph printer 10, according to the gestalt of films, such as a class of films, such as an advanced photo system (Advanced Photo System) and a negative (or reversal) film of 135 sizes, size and SUTORIPPUSU, and a slide, etc., the carrier of dedication with which the body of a scanner 12 can be equipped freely is prepared, and it can respond to various kinds of films or processing by exchanging carriers. The image (coma) with which is photoed by the film and print creation is presented is conveyed by the predetermined reading station with this carrier. In case the image photoed by Film F is read in such a scanner 12, it is injected from the light source 22, and when the reading light quantity of light adjustment was carried out [light] by the variable aperture 24 carries out incidence to the film F located in the predetermined reading station and penetrates with a carrier, the projection light which supports the image photoed by Film F is obtained.

[0016] Film F being located in a predetermined reading station as a carrier 30 is shown in drawing 2 (A) Conveyance roller pair 30a and 30b which convey the longitudinal direction of Film F in accordance with the direction of vertical scanning which intersects perpendicularly with the extension direction (main scanning direction) of the Rhine CCD sensor of image sensors 34 and which are arranged on both sides of a reading station in the direction of vertical scanning, It has the mask 40 which has slit 40a which regulates the projection light of Film F in the shape of [predetermined] a slit, and which extends in the main scanning direction in which it is located corresponding to a reading station. Incidence of the film F is carried out in reading light, being located in a reading station and conveyed in the direction of vertical scanning by this carrier 30. Thereby, as a result, slit scanning is carried out two-dimensional by slit 40a to which Film F extends in a main scanning direction, and the image of each coma photoed by Film F is read.

[0017] The magnetic head 42 which the magnetic-recording medium is formed, and reads the information recorded on this magnetic-recording medium on the carrier corresponding to the film

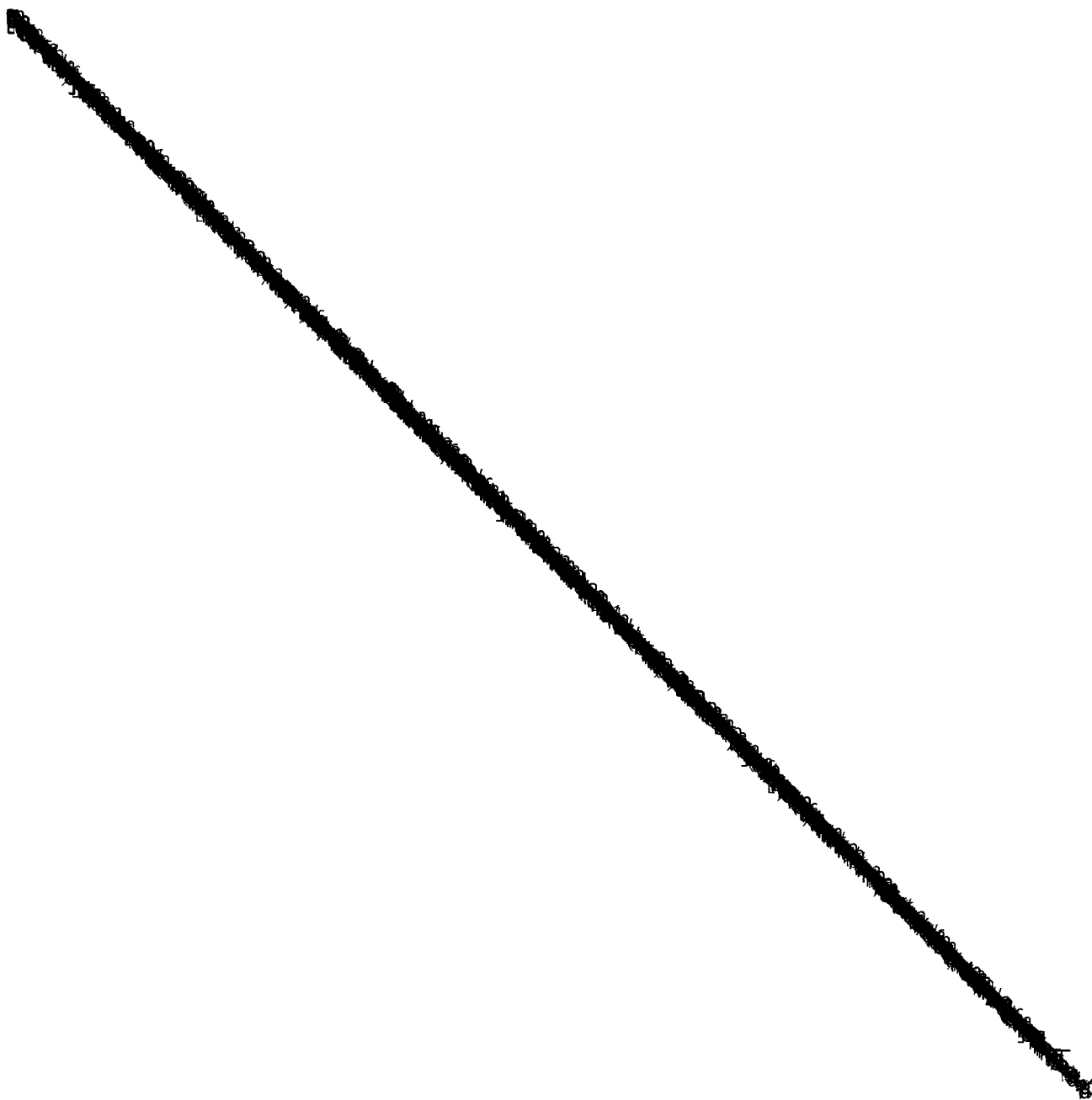
(cartridge) of an advanced photo system, and records required information on the film of an advanced photo system is arranged. It is read by the magnetic head 42 of a carrier 30, and is sent to the required part of image processing system 14 grade from scanner 12 body, or the information from image processing system 14 grade is transmitted to a carrier 30 from scanner 12 body, and the information recorded on the magnetic-recording medium of a film is recorded on the magnetic-recording medium of Film F by the magnetic head 42. Moreover, the code reader 44 for reading bar codes, such as the DX code optically recorded on a film by the carrier 30, the extended DX code, and the FNS code, and various kinds of information optically recorded on the film is arranged, and various kinds of information read by the code reader 44 is sent to the required part of image processing system 14 grade.

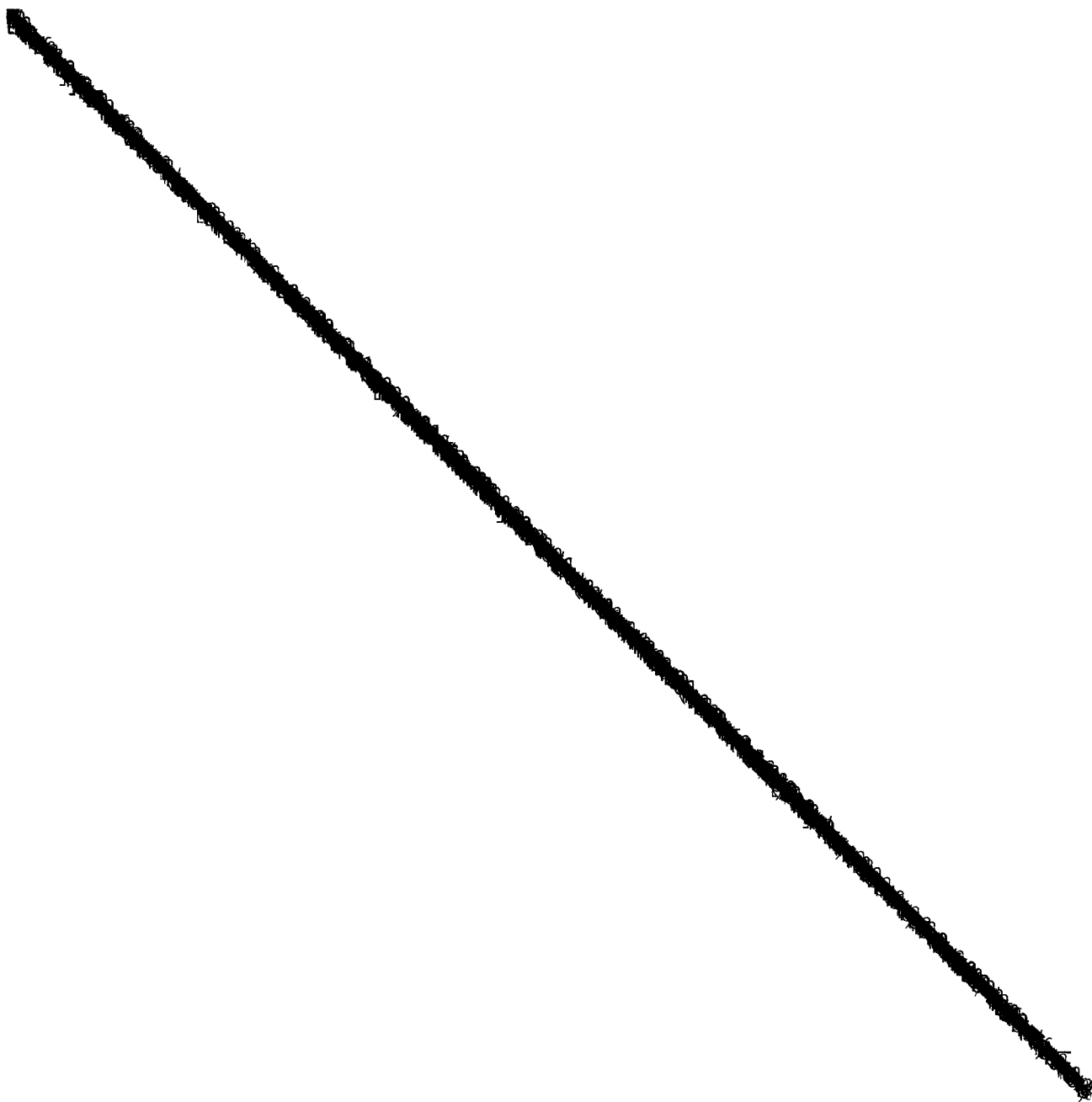
[0018] As mentioned above, reading light turns into projection light which penetrates the film F held at the carrier 30, and supports an image, and image formation of this projection light is carried out to the light-receiving side of image sensors 34 by the image formation lens unit 32. As shown in drawing 2 (B), image sensors 34 are the so-called color CCD sensors of three lines which have Rhine CCD sensor 34G which perform reading of Rhine CCD sensor 34R which reads R image, and G image, and Rhine CCD sensor 34B which performs reading of B image, and each Rhine CCD sensor has extended in the main scanning direction as mentioned above. By these image sensors 34, it is decomposed into the three primary colors of R, G, and B, and the projection light of Film F is read in photoelectricity. It is sent to an image processing system 14, the output signal of image sensors 34 being amplified with amplifier 36, and being used as a digital signal with A/D converter 38.

[0019] In a scanner 12, it carries out by two image reading by the press can which reads reading of the image photoed by Film F with a low resolution, and this scan for obtaining the image data of an output image. A press can is performed on the reading conditions of the press can set up beforehand so that the image of all the target films [scanner / 12] can be read without saturating image sensors 34. On the other hand, this scan is performed on the reading conditions of this scan set up for every coma so that image sensors 34 may be saturated with concentration [a little] lower than the least concentration of the image (coma) from press can data. Therefore, the output signals of a press can and this scan differ in resolution and an output level.

[0020] In addition, in this invention, limitation is not carried out to what twists the scanner used as an image data source of supply to such slit scanning, but the field exposure which reads the whole surface of the image of one coma at once may be used. In this case, what is necessary is for each color filter of R, G, and B to perform establishing the insertion means of each color filter of R, G, and B between the light source and Film F, inserting a color filter for example, using an area CCD sensor, and reading an image by the area CCD sensor one by one, and to decompose into the three primary colors and just to perform the image photoed by the film one by one. As an image data source of supply, moreover, besides the scanner which reads the image of such a film F Image pickup devices, such as the image reader and digital camera which read the image of a reflection copy, and a digital camcorder, Means of communications, such as LAN (Local Area Network) and a computer communication network, Media (record medium), such as a memory card, MO (magneto-optic-recording medium), and photo CD, etc., Various kinds of image reading means and image pick-up means, an image data storage means, etc. are illustrated, and the print which reproduced reception and its image for the image data of a subject-copy image from these image data sources of supply of various kinds of may be created.

[0021] As mentioned above, the output signal (image data) from a scanner 12 is outputted to an image processing system 14. The block diagram of an image processing system 14 is shown in drawing 3. As shown in drawing 3, an image processing system 14 (it considers as a processor 14 hereafter) has the data-processing section 46, the Log converter 48, the press can (frame) memory 50, this scanning (frame) memory 52, the press can processing section 54, this scanning-and-processing section 56, and the conditioning section 58, and is constituted. Drawing 3 is what mainly shows an image-processing-related part. In addition, to an image processing system 14 CPU which performs control and management of the photograph printer 10 whole which contains an image processing system 14 besides this, The memory which memorizes





fixed conditions, it is desirable to enable it to choose suitably according to directions by the operator etc. Moreover, limitation is not carried out to one but fixed conditions set up two or more fixed conditions, and they may be chosen from image characteristic quantity etc. and they may set them up as image-processing conditions.

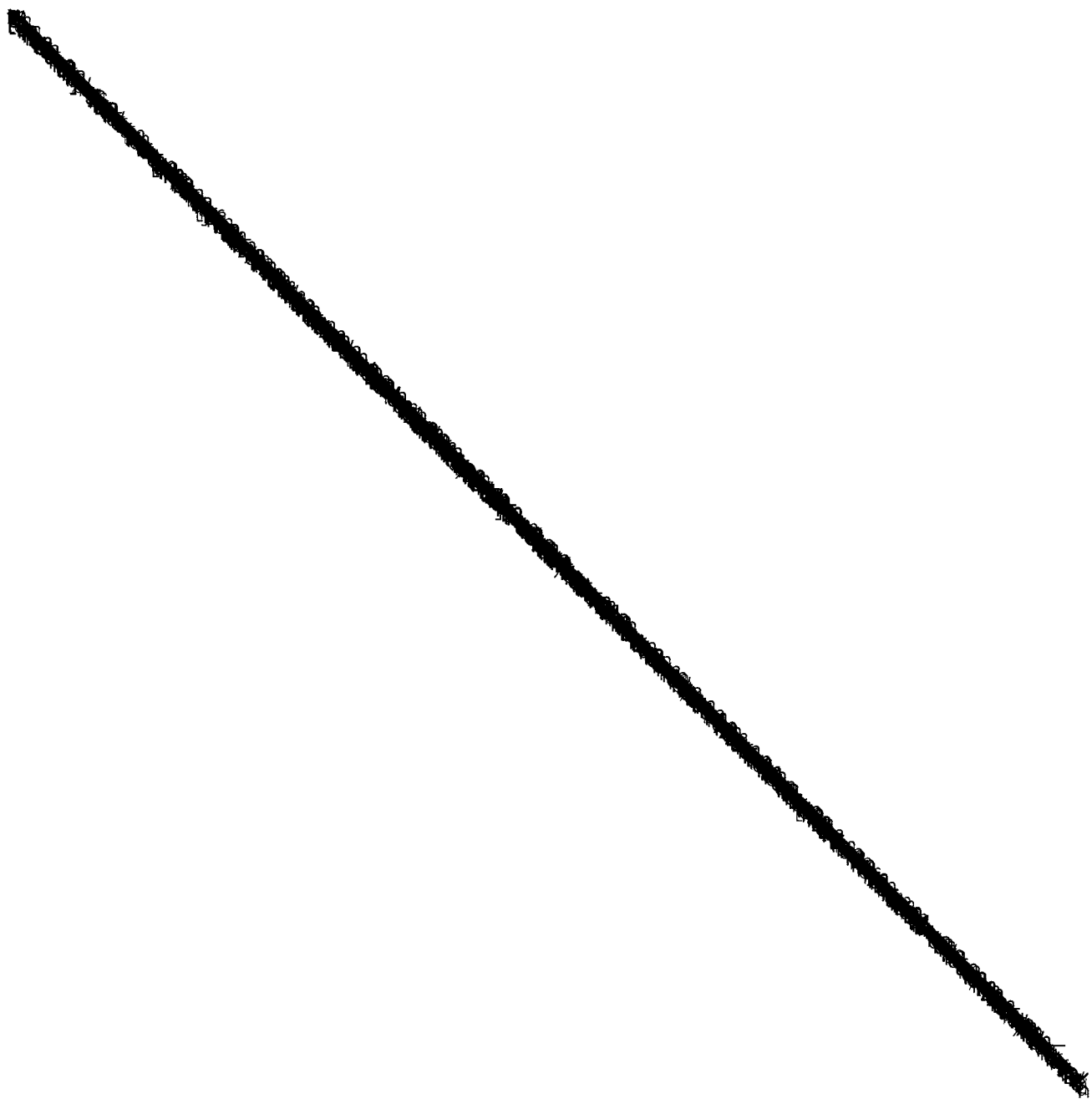
[0032] According to the amendment directions by operators, such as color correction, concentration amendment, and gradation amendment, inputted from keyboard 18a of the actuation system 18, or mouse 18b, the key amendment section 74 computes the amount of amendments of an image, and supplies it to the parameter integrated section 76. In the example of illustration, the amendment key 80 as keyboard 18a indicated to be to drawing 4 is set up. Image amendment of the reinforcement according to the pushed count is performed by this amendment key's 80 performing each color correction of concentration (D) amendment, cyanogen (C), a Magenta (M), and yellow (Y), and gradation (gamma) amendment, and pushing the 3 square keys by the side of each "+" and "-." Moreover, the amendment key which amends sharpness reinforcement, cover baking reinforcement, etc. besides this is arranged at keyboard 18a.

[0033] The parameter integrated section 76 amends the image-processing conditions which a setup and the setup section 70 of the amendment conditions for performing this image amendment set up according to the amount of amendments computed in the key amendment section 74 according to reception and according to operator further amendment directions in the image-processing conditions which the setup section 70 set up, and sets each processing conditions as the predetermined part (hardware) of the press can processing section 54 and this scanning-and-processing section 56. In addition, the parameter integrated section 76 creates LUT for amendment as amendment conditions for performing image amendment, and adjusts as an example the image-processing conditions which the setup section 70 set up to the amendment directions inputted by the above-mentioned amendment key 80 in this example to amendment directions of the other sharpness reinforcement, cover baking processing reinforcement, etc. (for example, if it is sharpness adjustment of sharpness gain).

[0034] Here, the cascade of the parameter integrated section 76 is carried out, and it sets LUT which can carry out a cascade (composition) as a predetermined part. In the example of illustration for example, the parameter integrated section 76 The 1st LUT which comes to carry out the cascade of each LUT which performs the gray balance adjustment, concentration adjustment, and gradation adjustment which the setup section 70 created, The 2nd LUT created according to the color correction and concentration amendment which were performed by the operator, The cascade of the four LUTs of the 3rd LUT created according to the gradation amendment performed by the operator and the 4th LUT which the setup section 70 which changes image data into the image data corresponding to a printer 16 created is carried out, and it is set as this scanning-and-processing section 56.

[0035] Moreover, after an image processing is decided in the case of a coincidence print, from the retrieval information on a coma, the reprint [match the retrieval information on the coma which created the print, and the information on the image processing of this coma, and / the storage means 78] in the case of delivery and a reprint, the parameter integrated section 76 reads the information on the image processing of that coma from the storage means 78, and supplies required information to the setup section 70. In addition, the information on an image processing is the image-processing conditions which the setup section 70 set up to the image processing performed to this coma and its sequence, and this coma, and the amendment directions which the operator performed to this coma, and is not the image-processing conditions actually set as the press can processing section 54 and this scanning-and-processing section 56. Also in case it not only can take coincidence of the image of a coincidence print and a reprint suitably by dividing and memorizing the image-processing conditions which the setup section set up, and the amendment directions by the operator in this way in this invention, but the reprint [it has the dissatisfaction in the image of a coincidence print and] (the so-called remake) by correcting, suitable correction can be made and the reprint according to a request of a customer can be outputted.

[0036] Although what is necessary is for the information on the amendment directions supplied



information on an image processing is the amendment directions by the image-processing conditions (a parameter and associated data are included) and operator whom are the information on the image processing for reproducing the same image processing as a coincidence print at the time of a reprint, and the class of image processing performed as mentioned above and sequence, and the setup section 70 set up etc.

[0043] The multiplier concerning various kinds of information which can reproduce a previous image processing (conditions) as image-processing conditions which the setup section 70 set up according to the image processing to perform, LUT specifically created for the image processing, or processing operation expression and the image processing defined beforehand etc. is illustrated. For example, what is necessary is just to memorize the thing LUT which processes by LUT like image data conversion corresponding to gray balance adjustment or a print 16. In addition, LUT of gray balance, concentration adjustment, and gradation adjustment may memorize what carried out the cascade as mentioned above (said 1st LUT). What is necessary is just to memorize the multiplier concerning MTX operation expression or MTX operation expression in the image processing which processes by the MTX operation like saturation amendment. Sharpness processing should just memorize sharpness gain. Since cover baking processing compresses a dynamic range using the image data which set up LUT and the processing operation, processed image data, and was processed and obtained, it should just memorize this LUT or a processing operation. In addition, each is memorized when LUT, a function expression, etc. are created for every color of R, G, and B.

[0044] the information on amendment directions -- for example, said adjustment key 80 -- it is -- concentration -- the increment in what key (+), and cyanogen -- key reduction [what] (-) and gradation -- what key -- what is necessary is just to memorize firmly (+) or the amendment directions which the operator actually keyed, such as (-), softly Or amendment conditions, such as LUT created according to these amendment directions of the 2nd LUT according to above-mentioned color / concentration amendment, the 3rd LUT according to gradation amendment, etc., and the correction factors (for example, sharpness gain etc.) adjusted according to amendment directions may be memorized. In addition, it memorizes, without carrying out the cascade of the LUT in this case.

[0045] There is especially no limitation in a storage means 78 to memorize retrieval information and the information on an image processing, and various kinds of means are available. For example, as long as it is the film F of an advanced photo system, the magnetic-recording medium formed in Film F may be used as a storage means 78. Moreover, record media, such as a floppy disk, a magneto-optic-recording medium, and an IC card, may be used as a storage means 78. In this case, a storage is read with a print by the drive which I have a customer provided with this record medium from a customer with Film F in the case of delivery and a reprint, and is connected to the photograph printer 10 at him. When the lab contractor (store) is creating a customer's database, it is good also considering this database as a storage means 78. In addition, what is necessary is just to make a retention period into about one month from a coincidence print generally, since a request of a reprint is less than one month from a coincidence print. Or they are LAN and WAN (Wide Area Network) about the storage means 78 and the personal computer which a processor 14 or a lab contractor owns. Means of communications, such as a computer communication network [like], may be connected and accessed, and storage and retrieval of the information on an image processing etc. may be performed.

[0046] As mentioned above, the image data from which the image data processed in the press can processing section 54 of a processor 14 was processed by the display 20 in this scanning-and-processing section 56 is sent to a printer 16, respectively. this invention -- setting -- a display 20 -- especially -- limitation -- there is nothing -- well-known display means, such as CRT (Cathode RayTube) and a liquid crystal display, -- various kinds -- it is available.

[0047] A printer 16 has the printer (printing equipment) which exposes sensitive material (printing paper) according to the supplied image data, and records a latent image, and the processor (developer) which performs predetermined processing to sensitive material [finishing / exposure], and is outputted to it as a print, and is constituted. By the printer, after cutting sensitive material to the predetermined length according to a print, a back print is

recorded, for example. Subsequently While becoming irregular according to the image data outputted from the processor 14 and deflecting three sorts of light beams, R exposure according to the spectral sensitivity characteristic of sensitive material, G exposure, and B exposure, to a main scanning direction By conveying sensitive material in the direction of vertical scanning which intersects perpendicularly with a main scanning direction, scan exposure of the sensitive material is carried out two-dimensional by said light beam, a latent image is recorded, and a processor is supplied. The processor which received sensitive material performs predetermined wet-developing processing of the color development, bleaching fixing, rinsing, etc., dries, considers as a print, and is classified and accumulated on predetermined units, such as film 1 duty.

[0048] Hereafter, by explaining an operation of the photograph printer 10 explains the image processing system of this invention to a detail more.

[0049] First, the case of a coincidence print is explained. The operator from whom print creation of Film F was requested equips the predetermined location of a scanner 12 with the carrier according to Film F, sets a film F to the predetermined location of a carrier, and after he inputs required directions of the print size which sets and creates Film F (cartridge) in the predetermined location of a carrier 30, in the case of a coincidence print, he directs print creation initiation. The drawing value of the variable aperture 24 of a scanner 12 and the storage time of image sensors (Rhine CCD sensor) 34 are set up by this according to the reading conditions of a press can. Then, a carrier 30 conveys Film F in the direction of vertical scanning at the rate according to a press can, a press can is started, and it sets to a predetermined reading station as mentioned above. Slit scanning of the film F is carried out, projection light carries out image formation to image sensors 34, it is decomposed into R, G, and B, and the image photoed by Film F is read in photoelectricity.

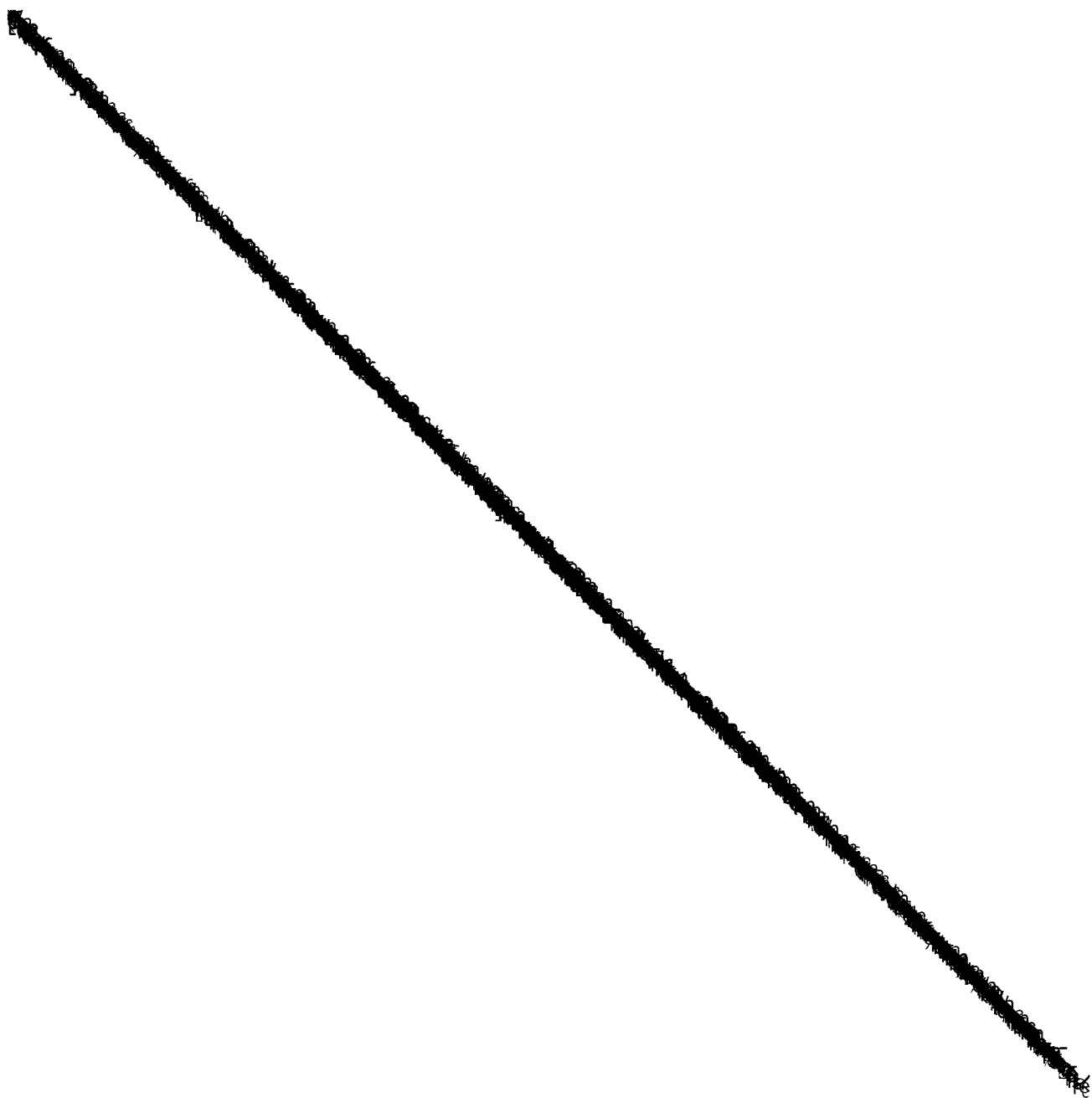
[0050] In addition, as a line, a press can and this scan are good, and may give every [predetermined two or more coma / all coma or] and a continuation target one coma of press cans and these scans at a time. The following examples explain one coma at a time to an example, in order to give explanation brief.

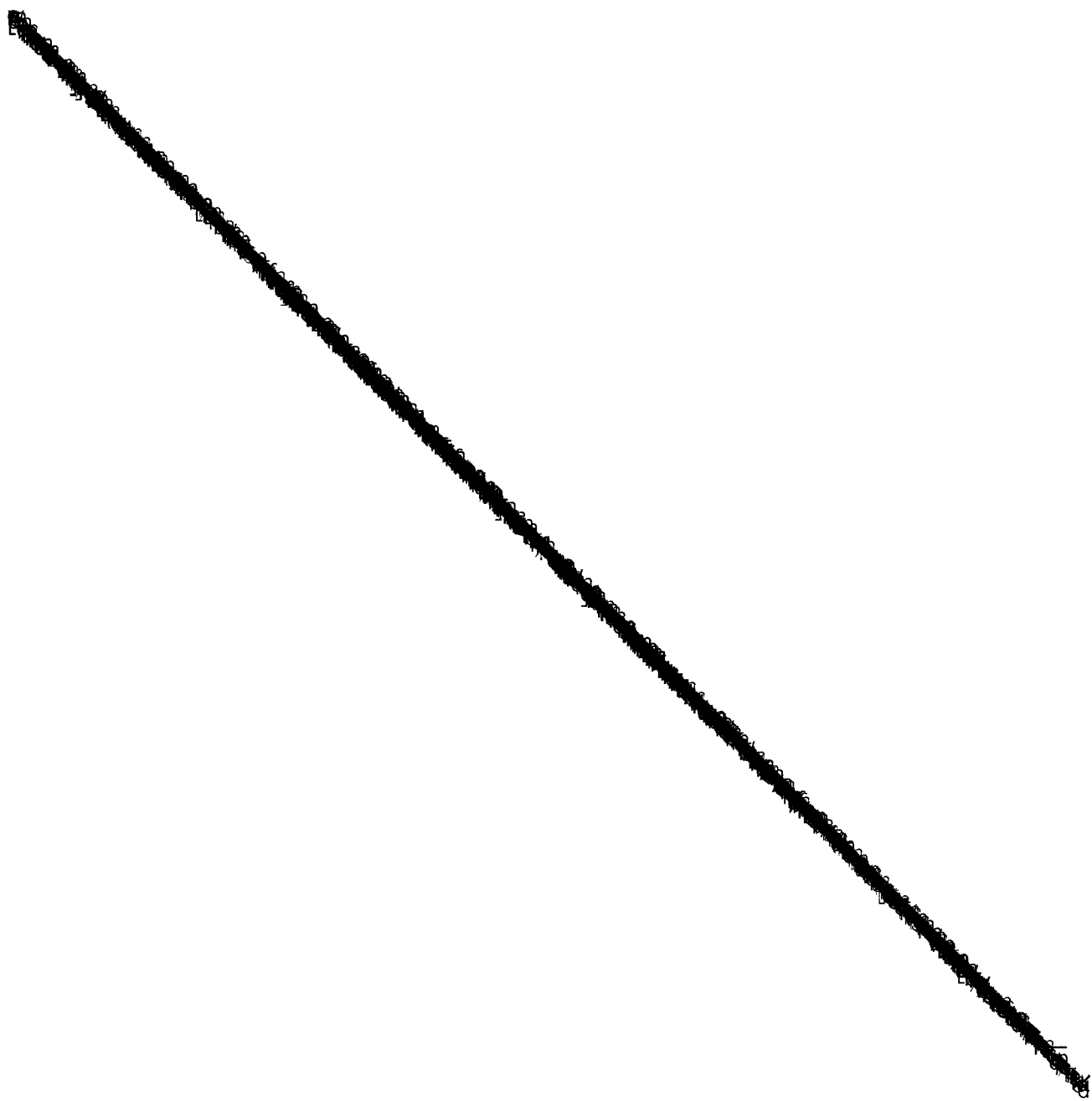
[0051] In the case of conveyance of this film F, bar codes, such as the DX code, are read by the code reader 44, and the magnetic information recorded on Film F by the magnetic head 42 of a carrier 30 on the occasion of conveyance of Film F when Film F was a film of an advanced photo system is read, and required information is sent to a processor 14. In using coma ID information as retrieval information, ID information acquisition section 72 acquires coma ID information from this magnetic information etc. In addition, what an operator may input coma ID information and may use an image characteristic value etc. as retrieval information besides coma ID information is as above-mentioned. The following explanation carries out the time of using coma ID information as retrieval information to an example.

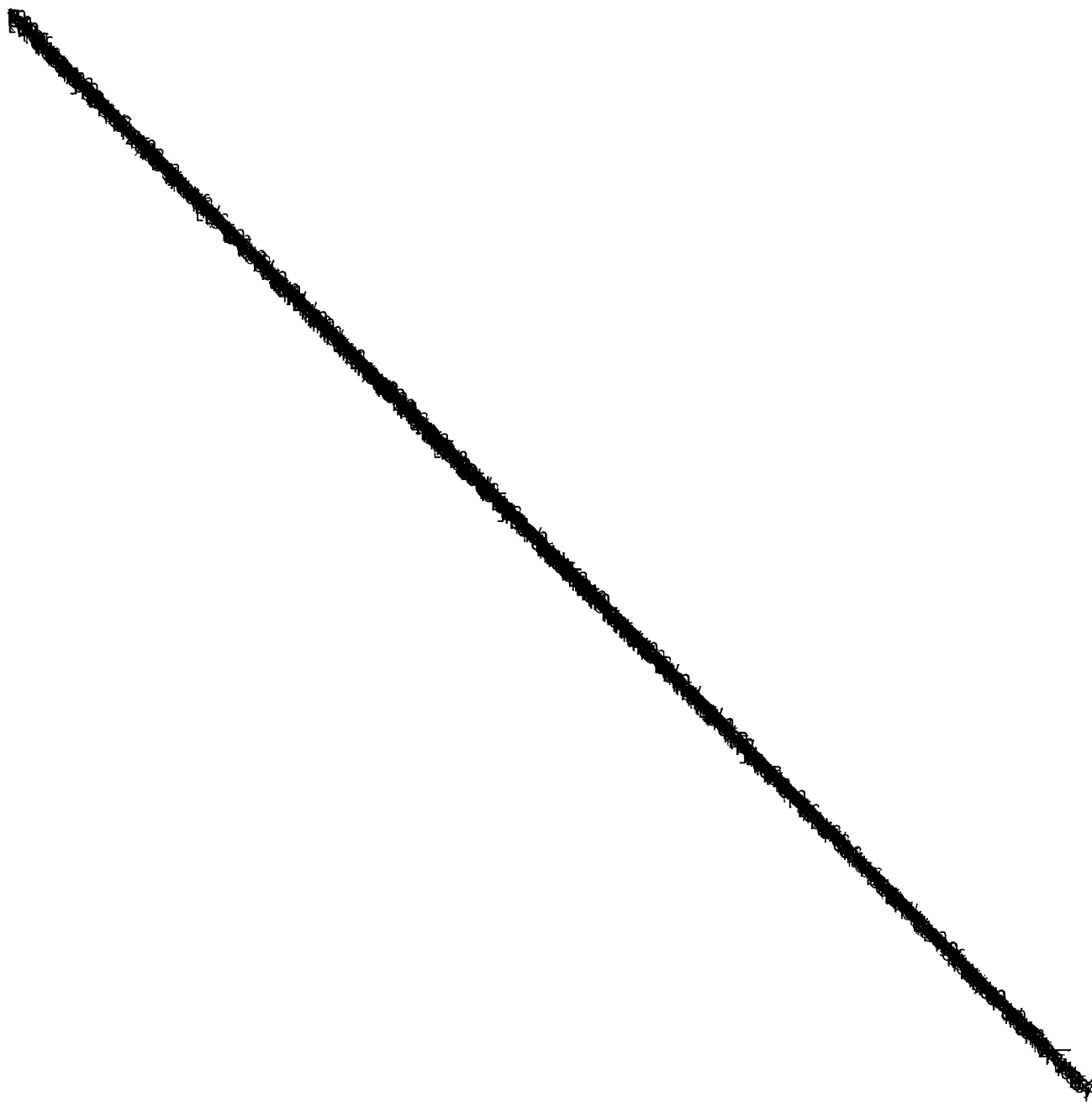
[0052] After it is sent to a processor 14, the output from image sensors 34 being amplified with amplifier 36, and being used as a digital signal with A/D converter 38 and predetermined processing of offset amendment etc. is performed to it in the data-processing section 46, it is changed by the Log transducer 48, is made into digital image data, and is memorized by the press can memory 50.

[0053] This will be read, and if press can data are memorized by the press can memory 50, as mentioned above, creation of a gray level histogram and calculation of image characteristic quantity are performed, and from the result, the setup section 70 will set up the reading conditions of these scans, such as a drawing value of a variable aperture 24, and will send to a scanner 12. The setup section 70 chooses further the image processing performed for the coma (image) according to directions by the gray level histogram and image characteristic quantity, and the operator, determines the sequence, and sets up image-processing conditions, such as each image processing and conversion to the image data corresponding to a display 20, further (calculation). The set-up processing conditions are sent to the parameter integrated section 76, and are set as the predetermined location (hardware) of the press can processing section 54 by the parameter integrated section 76.

[0054] If processing conditions are set as the press can processing section 54 when authorizing,







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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the block diagram of an example using the image processing system of this invention of a digital photograph printer.

[Drawing 2] (A) shows the conceptual diagram of the image sensors arranged at the digital photograph printer by which (B) is shown in drawing 1 in the conceptual diagram of the scanner with which the digital photograph printer shown in drawing 1 is loaded, respectively.

[Drawing 3] It is the block diagram of an example of the image processing system of the digital photograph printer shown in drawing 1 .

[Drawing 4] It is the schematic diagram of an example of the amendment key set as the digital photograph printer shown in drawing 1 .

[Description of Notations]

10 Digital Photograph Printer

12 Scanner

14 Image Processing System

16 Printer

18 Actuation System

20 Display

22 Light Source

24 Variable Aperture

28 Diffusion Box

30 Carrier

32 Image Formation Lens Unit

34 Image Sensors

36 Amplifier

38 A/D Converter

42 Magnetic Head

44 Code Reader

46 Data-Processing Section

48 Log Converter

50 Press Can (Frame) Memory

52 This Scanning (Frame) Memory

54 Press Can Processing Section

56 This Scanning-and-Processing Section

58 Conditioning Section

70 Setup Section

72 ID Information Acquisition Section

74 Key Amendment Section

76 Parameter Integrated Section

78 Storage Means

80 Amendment Key

[Translation done.]

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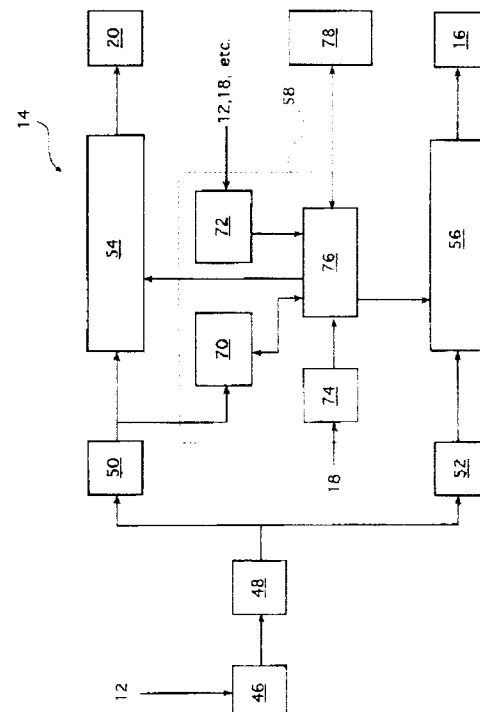
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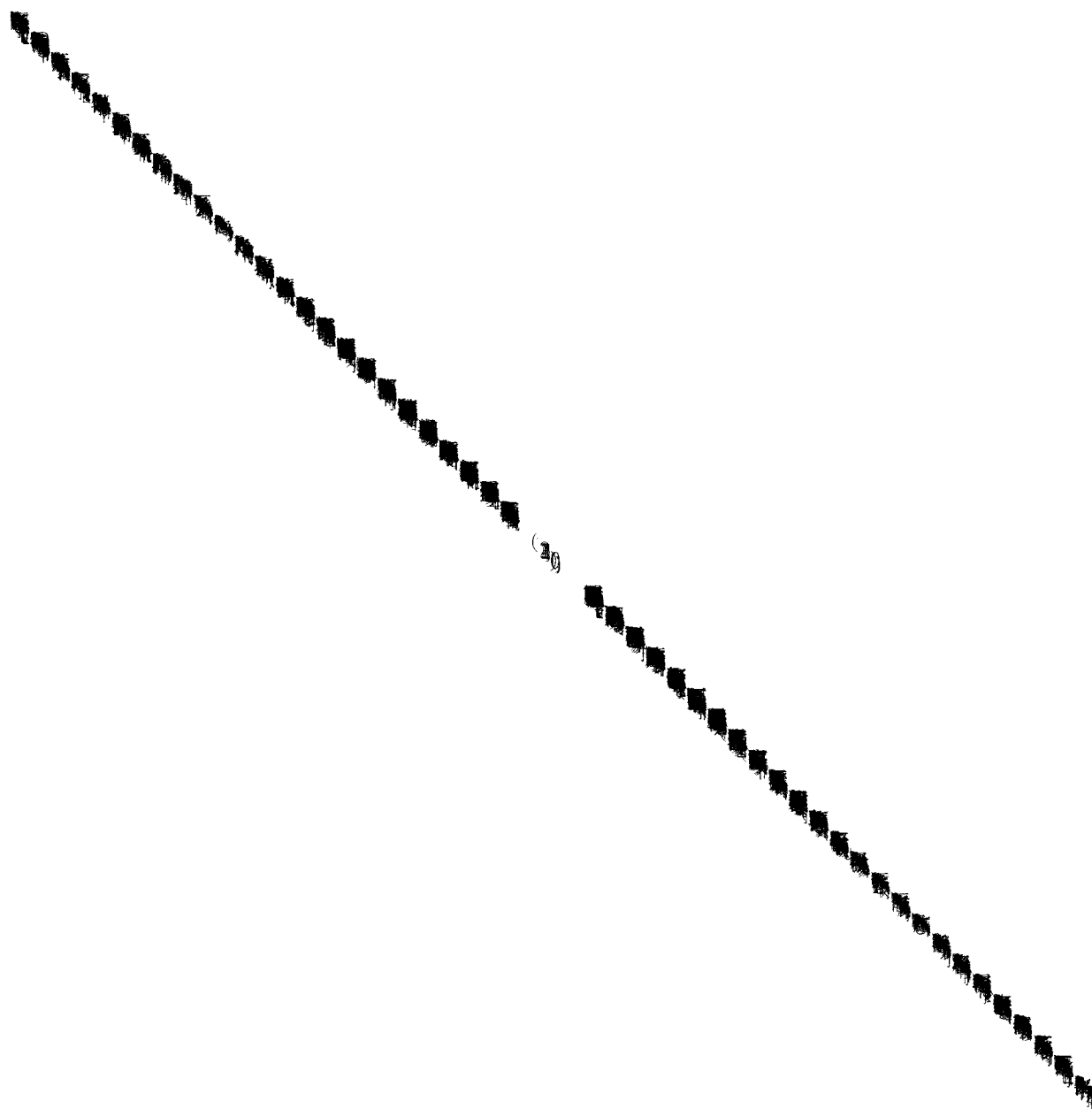
(54)【発明の名称】 画像処理装置

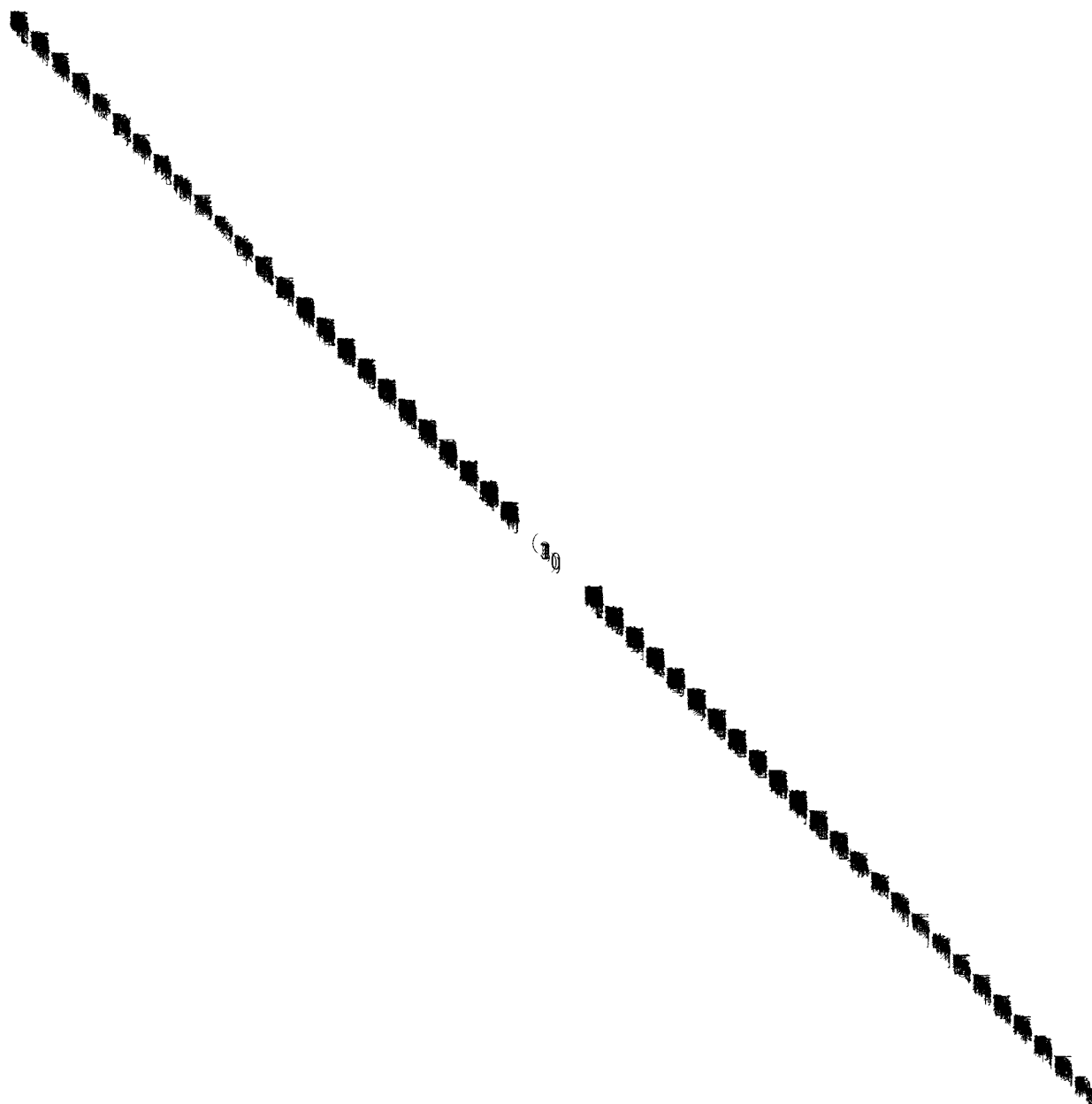
(57)【要約】

【課題】再プリントの際に、前回のプリントの画像と色や濃度が同様の画像を安定して再現することができ、また、リメイクの際にも、適正かつ好適に画像を修正したプリントを作成することができる画像処理装置を提供する

【解決手段】第1の画像処理条件を設定する第1設定手段と、画像補正指示を行う補正指示手段と、画像補正指示あるいはさらに第1の画像処理条件を記憶する記憶手段と、第1の画像処理条件および画像補正指示に応じて第2の画像処理条件を設定する第2設定手段と、第2の画像処理条件に応じて、画像データ供給源から供給された画像データに画像処理を施す画像処理手段とを有し、第2設定手段は、記憶手段に画像補正指示等が記憶されている画像データを処理する際には、該当する画像補正指示等を用いて、先に設定した第2の画像処理条件を再現することを特徴とする画像処理装置







のキャリアが用意されており、キャリアを交換することにより、各種のフィルムや処理に対応することができる。フィルムに撮影され、プリント作成に供される画像（コマ）は、このキャリアによって所定の読取位置に搬送される。このようなスキャナ12において、フィルムFに撮影された画像を読み取る際には、光源22から射出され、可変絞リ24によって光量調整された読取光が、キャリアによって所定の読取位置に位置されたフィルムFに入射して、透過することにより、フィルムFに撮影された画像を担持する投影光を得る。

【0016】キャリア30は、図2（A）に示されるように、所定の読取位置にフィルムFを位置しつつ、イメージセンサ34のラインCCDセンサの延在方向（主走査方向）と直交する副走査方向に、フィルムFの長手方向を一致して搬送する、読取位置を副走査方向に挟んで配置される搬送ローラ対30aおよび30bと、フィルムFの投影光を所定のスリット状に規制する、読取位置に対応して位置する主走査方向に延在するスリット40aを有するマスク40とを有する。フィルムFは、このキャリア30によって読取位置に位置されて副走査方向に搬送されつつ、読取光を入射される。これにより、結果的にフィルムFが主走査方向に延在するスリット40aによって2次的にスリット走査され、フィルムFに撮影された各コマの画像が読み取られる。

【0017】新写真システムのフィルムには、磁気記録媒体が形成されており、新写真システムのフィルム（カートリッジ）に対応するキャリアには、この磁気記録媒体に記録された情報を読み取り、また、必要な情報を記録する磁気ヘッド42が配置されている。フィルムの磁気記録媒体に記録された情報は、キャリア30の磁気ヘッド42で読み取られて、スキャナ12本体から画像処理装置14等の必要な部位に送られ、あるいは、画像処理装置14等からの情報が、スキャナ12本体からキャリア30に転送され、磁気ヘッド42によってフィルムFの磁気記録媒体に記録される。また、キャリア30には、フィルムに光学的に記録されるDXコード、拡張DXコード、FNSコード等のバーコードや、フィルムに光学的に記録された各種の情報を読み取るためのコードリーダ44が配置されており、コードリーダ44で読み取られた各種の情報が画像処理装置14等の必要な部位に送られる。

【0018】前述のように、読取光はキャリア30に保持されたフィルムFを透過して画像を担持する投影光となり、この投影光は、縮像レンズユニット32によってイメージセンサ34の受光面に結像される。図2（B）に示されるように、イメージセンサ34は、R画像の読み取りを行うラインCCDセンサ34R、G画像の読み取りを行うラインCCDセンサ34G、およびB画像の読み取りを行うラインCCDセンサ34Bを有する、いわゆる3ラインのカラーCCDセンサで、各ラインCC

Dセンサは、前述のように主走査方向に延在している。フィルムFの投影光は、このイメージセンサ34によって、R、GおよびBの3原色に分解されて光電的に読み取られる。イメージセンサ34の出力信号は、アンプ36で増幅され、A/D変換器38でデジタル信号とされて、画像処理装置14に送られる。

【0019】スキャナ12においては、フィルムFに撮影された画像の読み取りを、低解像度で読み取るプレスキャンと、出力画像の画像データを得るための本スキャンとの、2回の画像読取で行う。プレスキャンは、スキャナ12が対象とする全てのフィルムの画像を、イメージセンサ34が飽和することなく読み取れるように、あらかじめ設定された、プレスキャンの読取条件で行われる。一方、本スキャンは、プレスキャンデータから、その画像（コマ）の最低濃度よりも若干低い濃度でイメージセンサ34が飽和するように、各コマ毎に設定された本スキャンの読取条件で行われる。従って、プレスキャンと本スキャンの出力信号は、解像度と出力レベルが異なる。

【0020】なお、本発明において、画像データ供給源となるスキャナは、このようなスリット走査によるものに限定はされず、1コマの画像の全面を一度に読み取る、面露光を利用するものであってもよい。この場合には、例えば、エリアCCDセンサを用い、光源とフィルムFとの間に、R、GおよびBの各色フィルタの挿入手段を設け、色フィルタを挿入してエリアCCDセンサで画像を読み取ることを、R、GおよびBの各色フィルタで順次行い、フィルムに撮影された画像を3原色に分解して順次行えばよい。また、画像データ供給源としては、このようなフィルムFの画像を読み取るスキャナ以外にも、反射原稿の画像を読み取る画像読取装置、デジタルカメラやデジタルビデオカメラ等の撮像デバイス、LAN(Local Area Network)やコンピュータ通信ネットワーク等の通信手段、メモリカードやMO（光磁気記録媒体）やフォトCD等のメディア（記録媒体）等の、各種の画像読取手段や撮像手段、画像データの記憶手段等が例示され、これらの各種の画像データ供給源から原画像の画像データを受け取り、その画像を再生したプリントを作成してもよい。

【0021】前述のように、スキャナ12からの出力信号（画像データ）は、画像処理装置14に出力される。図3に、画像処理装置14のブロック図を示す。図3に示されるように、画像処理装置14（以下、処理装置14とする）は、データ処理部46、log変換器48、プレスキャン（フレーム）メモリ50、本スキャン（フレーム）メモリ52、プレスキャン処理部54、本スキャン処理部56、および条件設定部58を有して構成される。なお、図3は、主に画像処理関連の部位を示すものであり、画像処理装置14には、これ以外にも、画像処理装置14を含むフォトプリンタ10全体の制御や管

理を行うCPU、フォトリソグラフィの作動等に必要な情報を記憶するメモリ、可変絞リ24の絞リ値やCCDセンサ34の蓄積時間を決定する手段等が配置され、また、操作系18やディスプレイ20は、このCPU等（CPUバス）を介して各部位に接続される。

【0022】スキャナ12から出力されたR、GおよびBの各出力信号は、まず、データ処理部46において、DCオフセット補正、暗時補正、シェーディング補正等の所定の処理を施され、Log変換器48で変換されてデジタルの画像データとされて、プレスキャン（画像）データはプレスキャンメモリ50に、本スキャン（画像）データは本スキャンメモリ52に、それぞれ記憶（格納）される。

【0023】プレスキャンメモリ50に記憶されたプレスキャンデータはプレスキャン処理部54において、本スキャンメモリ52に記憶された本スキャンデータは本スキャン処理部56において、それぞれ処理される。プレスキャン処理部54と本スキャン処理部56は、共に、後に詳述する条件設定部58の設定に応じて、スキャナ12によって読み取られた画像（画像データ）に画像処理を施し、さらに、プレスキャン処理部54はディスプレイ20による表示に対応する画像データに、他方、本スキャン処理部56はプリンタ16による画像記録（感光材料の露光）に対応する画像データに、それぞれ変換する部位である。両処理部で施す画像処理および各種の処理条件は、条件設定部58で設定される。

【0024】プレスキャン処理部54および本スキャン処理部56においては、処理する画像データの画素密度が異なる以外には、基本的に同様の画像処理を施す。画像処理は、具体的には、グレイバランス調整、階調調整、濃度調整、彩度調整、シャープネス（鮮鋭化）処理、覆い焼き処理、電子変倍処理、幾何学歪補正、周辺光量補正、ソフトフォーカスや白黒仕上げ等の特殊仕上げ、赤目補正等、公知の各種の画像処理の1以上に加え、オペレータの画像補正指示（以下、補正指示とする）による色調整および濃度調整、ならびに階調調整が例示される。

【0025】これらの各補正は、公知の方法で行えばよく、処理演算、LUT（ルックアップテーブル）による処理、マトリクス（MATRIX）演算、ローパスフィルタ（LPF）による処理等を適宜組み合わせで行われる。一例を挙げれば、グレイバランス調整、濃度調整、階調調整および色調整は、主に、画像特徴量に応じて作成されるLUTを用いる方法が例示される。なお、これらの補正テーブルは、通常、R、GおよびBの各色毎に作成される。彩度調整は、MATRIX演算を用いて行う方法が例示される。シャープネス処理は、画像を周波数成分に分け、中・高周波数成分から得られた輝度信号にシャープネスゲイン（鮮鋭度補正係数）を乗算して、得られた輝度情報を低周波数成分に加算する方法が例示される。覆

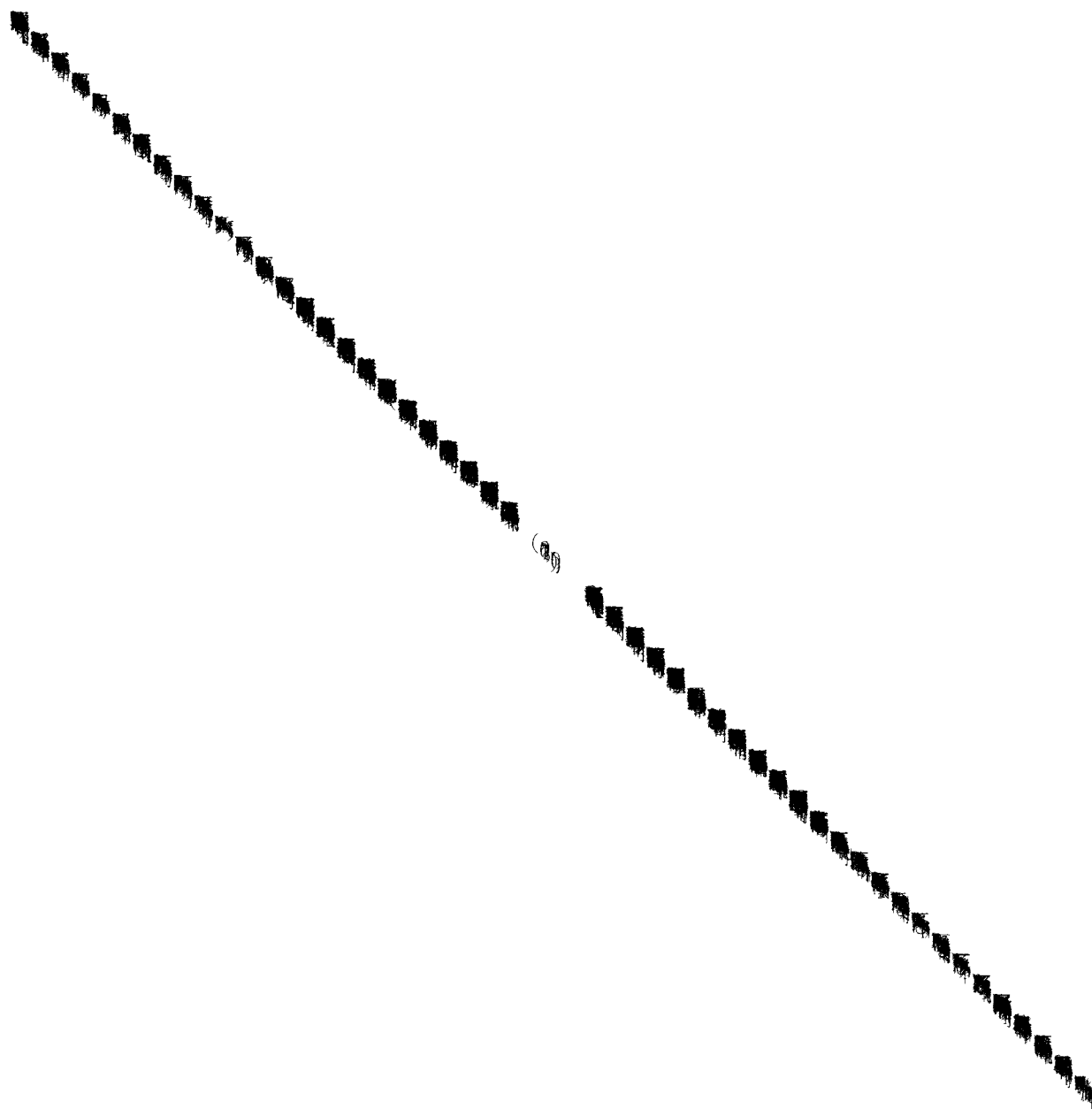
い焼き処理は、画像データを変換した輝度信号やフィルタ処理によってボケ画像（データ）を生成し、このボケ画像を用いてLUT等を作成して、このLUT等で処理した画像データで、高濃度領域および低濃度領域を圧縮もしくは伸長することにより、中間階調を保持して画像のダイナミックレンジを圧縮／伸長して、直接露光における覆い焼き効果を付与する方法が例示される（特開平9-18704号、同9-182093号の各公報等参照）。電子変倍処理は、補間演算によって行う方法が例示される。

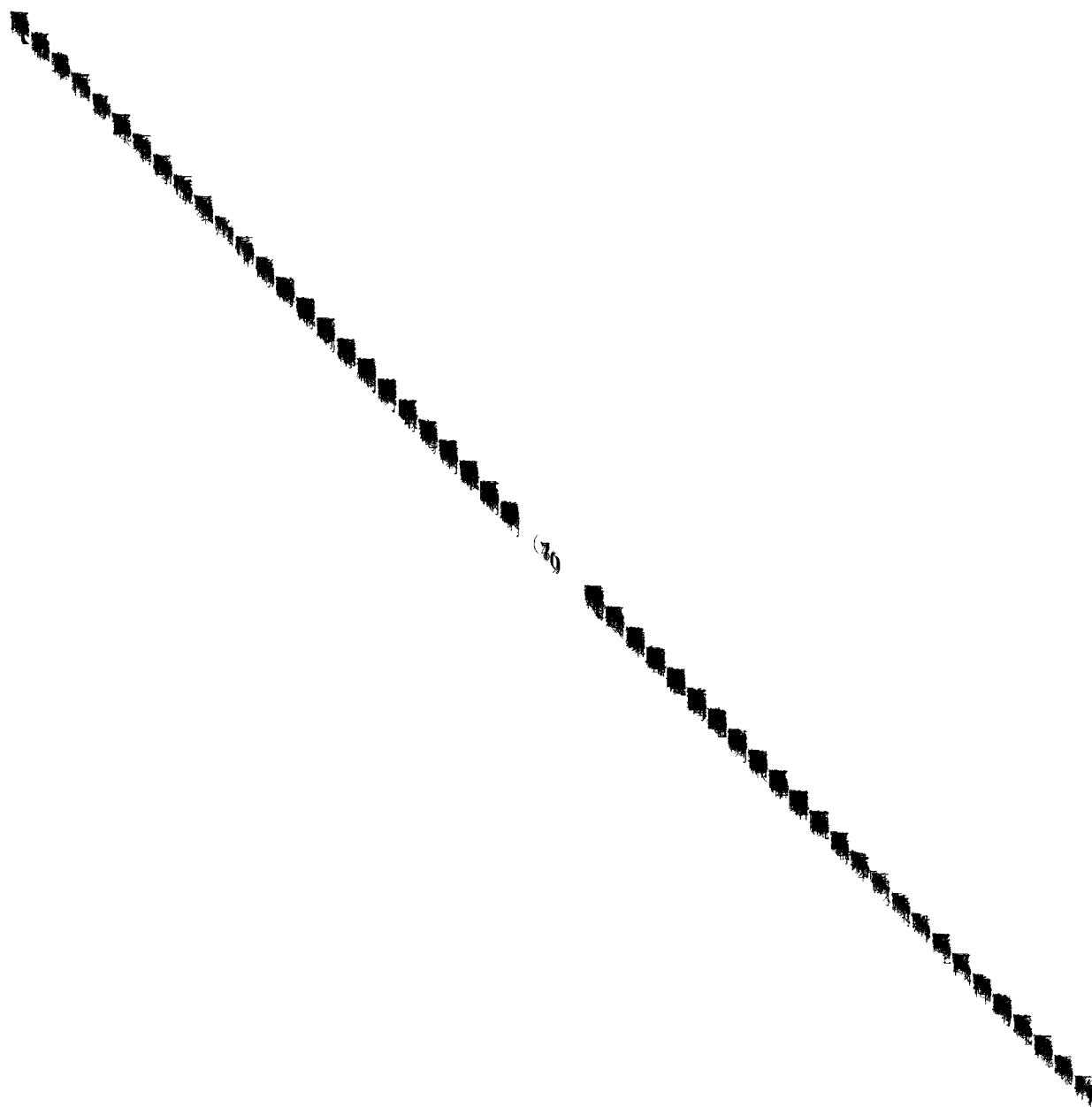
【0026】プレスキャン処理部54は、さらに、これらの画像処理を施された画像データを3D（3次元）-LUT等で変換して、ディスプレイ20による表示に対応する画像データとする。また、本スキャン処理部56は、同様に、画像処理を施された画像データを3D-LUT等で変換して、プリンタ16による画像記録に対応する画像データに変換し、プリンタ16に供給する。プリンタ16は、この画像データに応じて変調した光ビームで、感光材料（印画紙）を走査露光して潜像を形成し、所定の現像処理を施してプリントとして出力する。

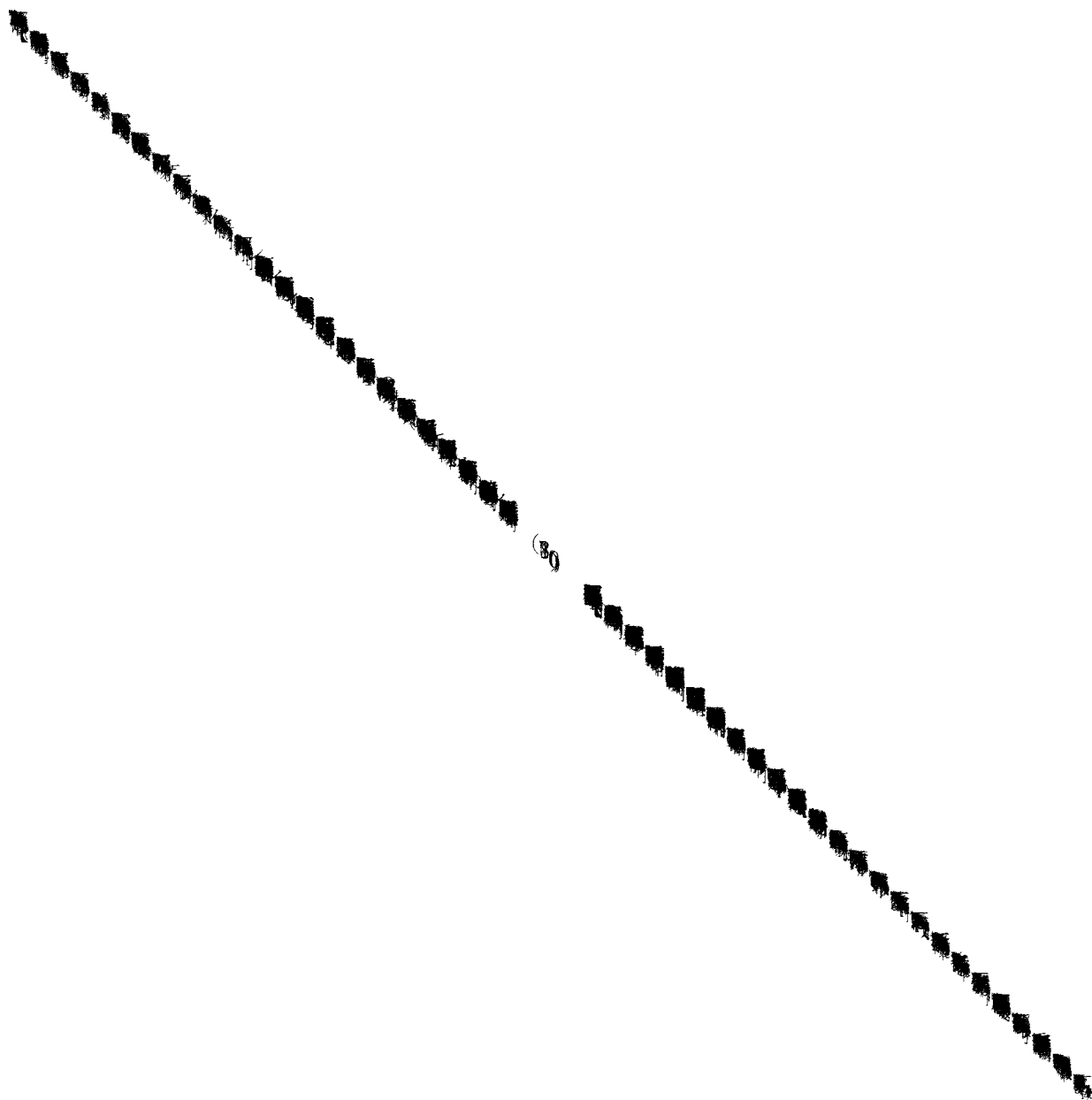
【0027】前述のように、プレスキャン処理部54および本スキャン処理部56で施す画像処理（変換も含む）の条件は、条件設定部58によって設定される。この条件設定部58は、セットアップ部70、1D情報取得部72、キー補正部74およびパラメータ統合部76を有して構成される。また、パラメータ統合部76には、先にプリントを作成したコマの検索情報と、そのコマの画像処理の情報とを対応付けて記憶する、記憶手段78が接続されている。なお、プリントを作成した際に記憶手段78に検索情報および画像処理の情報を記憶されるのは、通常は、いわゆる同時プリントの際であるので、以下、これを同時プリントとし、それ以外を再プリントとする。

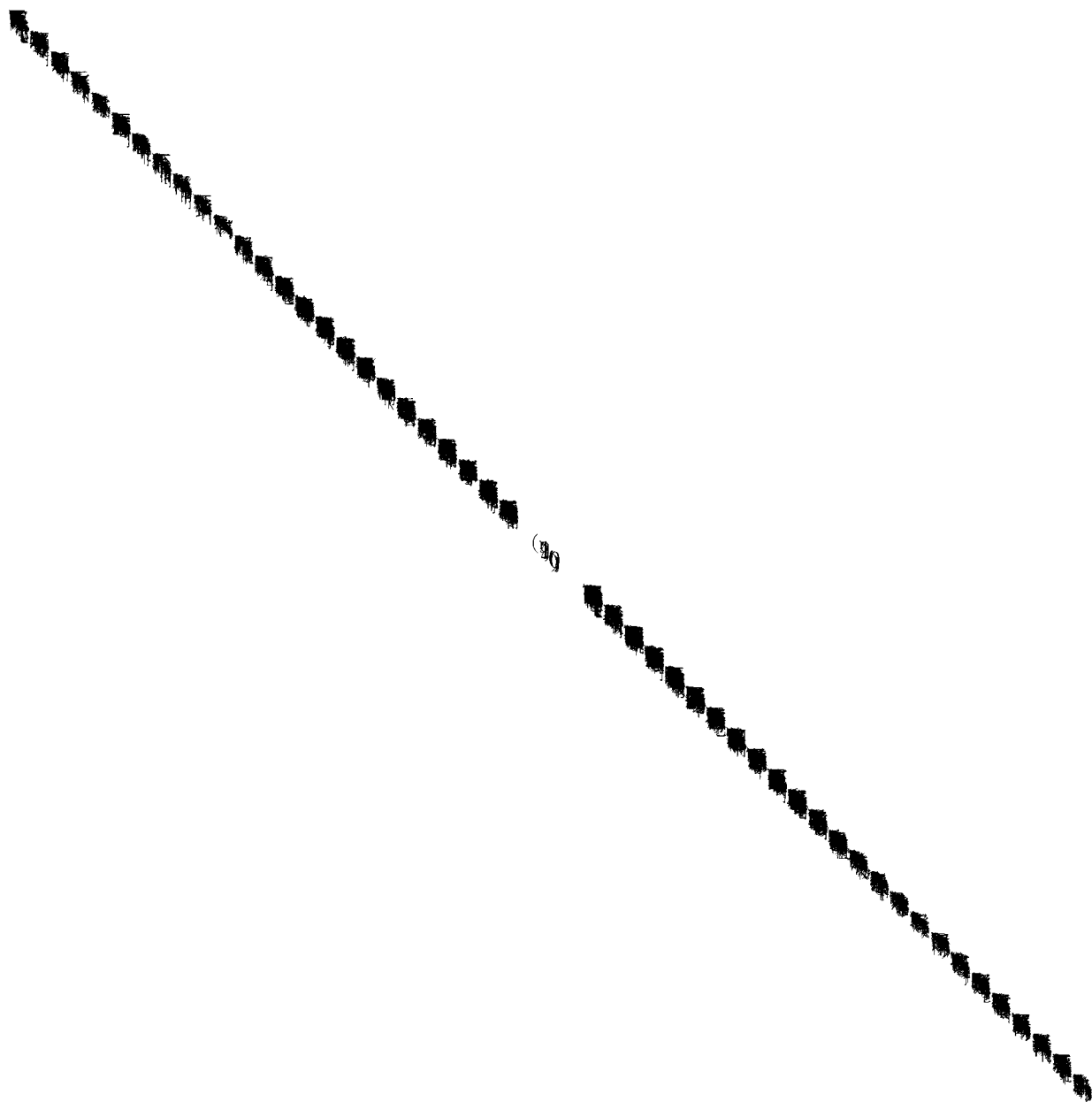
【0028】セットアップ部70は、プレスキャン処理部54および本スキャン処理部56で施す画像処理条件を設定する。具体的には、同時プリントの際には、セットアップ部70は、プレスキャンデータから、濃度ヒストグラムの作成や、平均濃度、ハイライト（最低濃度）やシャドウ（最高濃度）等の濃度ヒストグラムの頻度所定%点、LATD（大面積透過濃度）、ヒストグラムの極大値および極小値濃度等の画像特徴量の算出、主要部抽出等を行い、前述のように本スキャンの読取条件を設定し、さらに、濃度ヒストグラムや画像特徴量を用いた画像解析や、オペレータの指示等に応じて、前述の各種の画像処理から実行する画像処理ならびに実行順序を決定し、さらに、画像処理等の処理条件を決定し、パラメータ統合部76に供給する。

【0029】他方、再プリントの際には、セットアップ部70は、同時プリントと同様に濃度ヒストグラムの作成や画像特徴量の算出を行って本スキャンの読取条件を









のコマID情報（検索情報）を取得すると、パラメータ統合部76は、ID情報取得部72から再プリントするコマのコマID情報を受取り、記憶手段78を検索して、このコマID情報に対応するコマの同時プリントの画像処理の情報を記憶手段78から読み出し、施した画像処理の種類および順序および画像処理条件の情報をセットアップ部70に供給すると共に、オペレータによる補正指示の情報をキー補正部74に送り、それに応じた補正量をキー補正部74に算出させ、それを得る。

【0064】セットアップ部70は、同時プリントと同様に、プレスキャンデータから濃度ヒストグラムの作成や画像特徴量の算出を行い、本スキャンの読取条件を設定し、また、算出した画像特徴量等とパラメータ統合部76から送られた画像処理の情報から、基本的に、同時プリントの際の画像処理を再現するように、施す画像処理や画像処理条件等を設定し、パラメータ統合部76に送る。パラメータ統合部76は、キー補正部74から得た補正量から、この補正を行うための補正条件、すなわち前述の第2LUTや第3LUT等を作成し、また、セットアップ部70から送られた画像処理条件を補正する。

【0065】検定を行う場合には、パラメータ統合部76は、セットアップ部70から送られた補正済の画像処理条件、および補正条件を、プレスキャン処理部54の所定位置に設定する。次いで、プレスキャンメモリ50からプレスキャンデータが読み出され、プレスキャン処理部54において、設定された画像処理条件や補正条件に応じて処理されて、プレスキャン画像がシュミレーション画像としてディスプレイ20に表示される。

【0066】オペレータは、このシュミレーション画像を見て、必要に応じて、同時プリントと同様に、各種の補正指示を入力し、その入力信号がキー補正部74に送られ、画像の補正量が算出され、これがパラメータ統合部76に送られる。パラメータ統合部76は、送られた補正量に応じて、プレスキャン処理部54に設定した第2LUT等の補正条件を補正あるいは再設定し、また、画像処理条件を補正あるいは再設定する。従って、オペレータによる入力に応じて、ディスプレイ20に表示される画像も変化する。

【0067】オペレータは、ディスプレイ20に表示される画像が適正である時（検定OK）すると、キーボード18a等を用いて、その旨を指示する。これにより、画像処理条件が確定し、パラメータ統合部76は、本スキャンの読取条件をスキャナ12に供給し、第1LUT～第4LUTのカスケード等を行って、本スキャン処理部56の所定位置に、各種の処理条件を設定する。

【0068】なお、再プリントの際の検定も、必ずしも行われる必要はない。検定を行わない場合には、パラメータ統合部76は、セットアップ部70から処理条件を受け取ったら本スキャン処理部56にこれを設定し、そ

の時点で画像処理条件が確定する。このような検定の有無は、モードとして選択可能にするのが好ましいが、同時プリントで出力された画像に不満を感じ、画像を修正したプリントを出力するリメイクの場合には、検定を行うのが好ましい。

【0069】画像処理条件が確定すると、本スキャンが開始される。本スキャンは、基本的に同時プリントと同様に行われ、スキャナ12は、供給された本スキャンの読取条件の基、イメージセンサ34からの出力信号はアンプ36で増幅されて、A/D変換器38でデジタル信号とされ、処理装置14のデータ処理部48で処理されて、Log変換器50で本スキャンデータとされ、本スキャンメモリ52に送られ、記憶される。次いで、本スキャンデータが本スキャンメモリ52から読み出され、本スキャン処理部56において、確定した処理条件で処理され、信号変換部68において変換された出力用の画像データとされ、プリンタ16に出力され、これを再現したプリントが出力される。

【0070】本発明の画像処理装置において、出力用の画像データは、プリンタ16のみならず、フロッピーディスク、MOディスク（磁気記録ディスク）、CD-R等の各種の記憶媒体に出力して、画像ファイルとしてもよい。

【0071】以上、本発明の画像処理装置について詳細に説明したが、本発明は上記実施例に限定はされず、本発明の要旨を逸脱しない範囲において、各種の改良および変更を行ってもよいのはもちろんである。

【0072】

【発明の効果】以上、詳細に説明したように、本発明によれば、同時プリントに再現された画像と、色や濃度が好適に一致する画像が再現された再プリントを、安定して、しかも簡易な操作で出力することができると共に、プリントのリメイクにも好適に対応して、顧客の要求に好適に応じた再プリントを出力することができる。

【図面の簡単な説明】

【図1】 本発明の画像処理装置を利用するデジタルフォトプリンタの一例のブロック図である

【図2】 (A)は図1に示されるデジタルフォトプリンタに装填されるスキャナの概念図を、(B)は図1に示されるデジタルフォトプリンタに配置されるイメージセンサの概念図を、それぞれ示す

【図3】 図1に示されるデジタルフォトプリンタの画像処理装置の一例のブロック図である

【図4】 図1に示されるデジタルフォトプリンタに設定される補正キーの一例の概略図である

【符号の説明】

10 (デジタル) フォトプリンタ

12 スキャナ

14 画像処理装置

16 プリンタ

(12)

特開平 1 1 - 3 4 1 2 7 5

【図 3】

